

What is claimed is:

1. A structure of a package for a semiconductor image pickup device,  
comprising:

5 a semiconductor image pickup device having at least one functional polymer layer  
formed on the surface of an image sensing unit at the center thereof and a plurality of  
electrode pads selectively exposed by an insulating film formed along the edges;

at least one metal thin film layer formed on the respective top parts of the exposed  
electrode pads;

10 a bump formed on the respective top parts of the metal thin film layer;

a printed circuit board provided with an opening so as to expose the functional  
polymer layer and a plurality of electrode pads bonding to the bump via an anisotropic  
conductive polymer; and

15 a glass filter attached on the printed circuit board and filtering the light incident upon  
the functionally polymer layer through the opening.

2. The structure of claim 1, wherein the functional polymer layer is comprised of  
a planarization layer, a color filter layer and a micro lens.

20 3. The structure of claim 1, wherein the metal thin film layer is comprised of a  
stack of a metallic bonding layer and a metal layer for plating.

4. The structure of claim 3, wherein the metallic bonding layer is made of metal  
such as Ti, Al or Cr or made of an alloy containing at least one of Ti, Al and Cr.

25 5. The structure of claim 3, wherein the metallic bonding layer is formed at a  
thickness of 100 to 5000Å.

30 6. The structure of claim 3, wherein the metal layer for plating is made of metal  
such as Au, Cu or Ni or made of an alloy containing at least one of Au, Cu and Ni.

7. The structure of claim 3, wherein the metal layer for plating is formed at a  
thickness of 100 to 5000Å.

8. The structure of claim 1, wherein the bump is made of one selected from the group consisting of Au, solder and Cu.

9. The structure of claim 1, wherein the anisotropic conductive polymer is a liquid anisotropic conductive adhesive or a solid anisotropic conductive film semi-hardened and having a predetermined shape.

10. The structure of claim 1, wherein the anisotropic conductive polymer is mainly comprised of a thermosetting resin, a thermoplastic resin or a combination thereof, and contains a predetermined amount of spherical or square conductive metal balls uniformly distributed.

11. The structure of claim 10, wherein the conductive metal balls are made of one selected from the group of consisting of Au, Ni, Ag and Cu.

12. The structure of claim 10, wherein the conductive metal balls have a particle size of 0.5 to 10 $\mu$ m.

13. The structure of claim 1, further comprising a lens holder supported on the printed circuit board; and a lens unit provided on the top part of the image sensing unit of the semiconductor image pickup device.

14. A fabrication method of a structure of a package for a semiconductor image pickup device, comprising the steps of:

forming an insulating film on the surface of a semiconductor image pickup device and then selectively etching the insulating film so as to expose electrode pads formed on the edges of the semiconductor image pickup device;

forming at least one functional polymer layer on an image sensing unit formed at the center of the semiconductor image pickup device;

forming at least one metal thin film layer on the top part of the resultant material while adjusting the surface temperature of the semiconductor image pickup device at the range between a room temperature and 200°C;

forming a photosensitive film on the top part of the metal thin film layer and then light-exposing and developing the same so as to expose the metal thin film layer of the regions where the electrode pads of the semiconductor image pickup device are formed;

forming a bump on the top part of the metal thin film layer exposed to the regions

5 where the electrode pads of the semiconductor image pickup device are formed; and

removing the photosensitive film and then etching the metal thin film layer using the bump as a mask.

15 10 15. The method of claim 14, wherein the functional polymer layer is comprised of a planarization layer, a color filter layer and a micro lens.

16. The method of claim 14, wherein the metal thin film layer is comprised of a stack of a metallic bonding layer and a metal layer for plating.

15 17. The method of claim 16, wherein the metallic bonding layer is made of metal such as Ti, Al or Cr or made of an alloy containing at least one of Ti, Al and Cr.

18. The method of claim 16, wherein the metallic bonding layer is formed at a thickness of 100 to 5000Å.

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19. The method of claim 16, wherein the metal layer for plating is made of metal such as Au, Cu or Ni or made of an alloy containing at least one of Au, Cu and Ni.

20. The method of claim 16, wherein the metal layer for plating is formed at a thickness of 100 to 5000Å.

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21. The method of claim 14, wherein the bump is made of one selected from the group consisting of Au, solder and Cu.

30 22. The method of claim 14, wherein, the step of forming a metal thin film layer, the surface temperature of the semiconductor image pickup device is adjusted between 50 to 180°C.

23. The method of claim 14, wherein the surface temperature of the semiconductor image pickup device is adjusted by the pressure and electric power used in the thin film process of forming a metal thin film layer.

24. The method of claim 14, wherein the thin film process of forming a metal thin film layer comprises the steps of: loading a substrate with a plurality of semiconductor image pickup devices on a table; moving the table so as to be located below metal material; and depositing the metal material while the table being stopped or transported in one direction.

25. The method of claim 24, wherein the table is formed in a flat-plate supporting plate or on a cylindrical support.

26. The method of claim 24, wherein the table is manufactured of Al or Al base alloy, Cu or Cu base alloy or Fe or Fe base alloy.

27. The method of claim 24, wherein a silicon base polymer is formed on the surface of the table at the regions contacting the substrate where the semiconductor image pickup device is formed and the table.

28. The method of claim 24, wherein a water cooled tube is formed inside the table at the regions contacting the substrate where the semiconductor image pickup device is formed and the table.

29. The method of claim 24, wherein the thin film process of forming a metal thin film layer further comprises the steps of: forming an opening on the printed circuit board having a plurality of circuit patterns mounted thereto so as to expose the image sensing unit provided at the center of the semiconductor image pickup device; forming substrate electrode pads along the edges of the opening; forming an anisotropic conductive polymer along the edges of the opening; thermo-compressing and hardening the anisotropic conductive polymer being sandwiched between the substrate electrode pads of the printed circuit board and the bump formed at the semiconductor image pickup device; attaching a glass filter to the edges of the opening of the printed circuit board so as to cover the opening of the printed circuit board; and mounting a lens unit on the top part of the image sensing unit of the semiconductor image pickup device.

30. The method of claim 29, wherein the anisotropic conductive polymer 650 is formed of a liquid anisotropic conductive adhesive or a solid anisotropic conductive film semi-hardened and having a predetermined shape.

31. The method of claim 29, wherein the anisotropic conductive polymer is mainly comprised of a thermosetting resin, a thermoplastic resin or a combination thereof, and contains a predetermined amount of spherical or square conductive metal balls uniformly distributed.

32. The method of claim 31, wherein the conductive metal balls are formed of one selected from the group of consisting of Au, Ni, Ag and Cu.

33. The method of claim 31, wherein the conductive metal balls have a particle size of 0.5 to 10 $\mu$ m.

34. The method of claim 29, wherein, in the step of thermo-compressing and hardening the anisotropic conductive polymer, the anisotropic conductive polymer is thermocompressed at a temperature between several tens and 200°C and then hardened by being preserved for several seconds to a few minutes.

35. The method of claim 29, wherein the thin film process of forming a metal thin film layer further comprises the step of re-heating and re-hardening the anisotropic conductive polymer after thermo-compressing and hardening the anisotropic conductive polymer.

36. The method of claim 29, wherein the step of attaching a glass filter to the edges of the opening of the printed circuit board so as to cover the opening of the printed circuit board is carried out under an inert gaseous atmosphere.

37. A fabrication method of a structure of a package for a semiconductor image pickup device, comprising the steps of:

forming an insulating film on the surface of a semiconductor image pickup device and then selectively etching the insulating film so as to expose electrode pads formed on the edges of the semiconductor image pickup device;

5       forming at least one functional polymer layer on an image sensing unit formed at the center of the semiconductor image pickup device;

      forming a stress preventing polymer layer on the image sensing unit where the functionally polymer layer is formed;

      forming at least one metal thin film layer on the top part of the resultant material;

10       forming a photosensitive film on the top part of the metal thin film layer and then light-exposing and developing the same so as to expose the metal thin film layer of the regions where the electrode pads of the semiconductor image pickup device are formed;

      forming a bump on the top part of the metal thin film layer exposed to the regions where the electrode pads of the semiconductor image pickup device are formed;

15       removing the photosensitive film and then etching the metal thin film layer using the bump as a mask; and

      removing the stress preventing polymer layer formed on the image sensing unit where the functional polymer layer is formed.

20       38.     The method of claim 38, wherein the functional polymer layer is comprised of a planarization layer, a color filter layer and a micro lens.

      39.     The method of claim 37, wherein the stress preventing polymer layer is formed by coating, light exposure and development.

25       40.     The method of claim 37, wherein the functional polymer layer and the stress preventing polymer layer are sequentially formed, and then simultaneously patterned by the coating, light exposure and development of the photosensitive film used as the stress preventing polymer layer and formed on the image sensing unit.

30       41.     The method of claim 37, wherein the metal thin film layer is comprised of a stack of a metallic bonding layer and a metal layer for plating.

      42.     The method of claim 41, wherein the metallic bonding layer is made of metal such as Ti, Al or Cr or made of an alloy containing at least one of Ti, Al and Cr.

43. The method of claim 41, wherein the metallic bonding layer is formed at a thickness of 100 to 5000Å.

5 44. The method of claim 41, wherein the metal layer for plating is made of metal such as Au, Cu or Ni or made of an alloy containing at least one of Au, Cu and Ni.

45. The method of claim 41, wherein the metal layer for plating is formed at a thickness of 100 to 5000Å.

10 46. The method of claim 37, wherein the bump is made of one selected from the group consisting of Au, solder and Cu.

15 47. The method of claim 37, wherein the thin film process of forming a metal thin film layer further comprises the steps of: forming an opening on the printed circuit board having a plurality of circuit patterns mounted thereto so as to expose the image sensing unit provided at the center of the semiconductor image pickup device; forming substrate electrode pads along the edges of the opening; forming an anisotropic conductive polymer along the edges of the opening; thermo-compressing and hardening the anisotropic conductive polymer  
20 being sandwiched between the substrate electrode pads of the printed circuit board and the bump formed at the semiconductor image pickup device; attaching a glass filter to the edges of the opening of the printed circuit board so as to cover the opening of the printed circuit board; and mounting a lens unit on the top part of the image sensing unit of the semiconductor image pickup device.

25 48. The method of claim 47, wherein the anisotropic conductive polymer 650 is formed of a liquid anisotropic conductive adhesive or a solid anisotropic conductive film semi-hardened and having a predetermined shape.

30 49. The method of claim 47, wherein the anisotropic conductive polymer is mainly comprised of a thermosetting resin, a thermoplastic resin or a combination thereof, and contains a predetermined amount of spherical or square conductive metal balls uniformly distributed.

50. The method of claim 49, wherein the conductive metal balls are formed of one selected from the group of consisting of Au, Ni, Ag and Cu.

51. The method of claim 49, wherein the conductive metal balls have a particle  
5 size of 0.5 to 10 $\mu$ m.

52. The method of claim 47, wherein, in the step of thermo-compressing and hardening the anisotropic conductive polymer, the anisotropic conductive polymer is thermocompressed at a temperature between several tens and 200°C and then hardened by  
10 being preserved for several seconds to a few minutes.

53. The method of claim 47, wherein the thin film process of forming a metal thin film layer further comprises the step of re-heating and re-hardening the anisotropic conductive polymer after thermo-compressing and hardening the anisotropic conductive  
15 polymer.

54. The method of claim 47, wherein the step of attaching a glass filter to the edges of the opening of the printed circuit board so as to cover the opening of the printed circuit board is carried out under an inert gaseous atmosphere.  
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